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Notes on Amphisbaenids (Amphisbaenia, Reptilia). 7 Redescription and Redefinition of *Amphisbaena mitchelli* Procter and *Amphisbaena slevini* Schmidt from the Middle and Lower Amazon, Brazil

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INTRODUCTION

It is a curious fact that, while *Amphisbaena alba* and *Amphisbaena fuliginosa*, which are among the largest South American amphisbaenids, have extremely wide ranges, the range of the smaller forms is very much more restricted. Such restriction is particularly noticeable in the areas at and north of the Amazon River from which only a limited number of forms have been reported, mostly from several disjunct localities. The present paper offers a redescription and redefinition of two forms from localities immediately adjacent to the main course of the Amazon. Both of these forms were originally described from single specimens, and it is now possible to amplify the description on the basis of much additional material, most of which was found in the collections of the American Museum of Natural History.

Amphisbaena mitchelli was described by Procter (1923, p. 1061), "from

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a single adult from Marajo Island, mouth of the Amazon," Brazil. The most diagnostic of the characteristics mentioned in her description is the presence of only two precloacal pores, particularly since her figure shows these to be elongate ovals rather than circles. The form is thus immediately differentiated from such two-pored species as *A. neglecta* Dunn and Piatt, and *A. silvestrii* Boulenger, and from possibly anomalous specimens of normally four-pored species. Only the Colombian species *A. spurrelli* shares the characteristic of two oval pores, and it is characterized by the presence of clubbed caudals (Gans, 1962).

No additional specimens have been described, and Amaral by fiat (1932, also 1937a, 1937b, 1949) placed the name in the synonymy of *A. vermicularis* without examining the types of either species. Burt and Burt (1931, p. 240), who had a specimen of *A. mitchelli* in hand, listed it as *A. vermicularis* without further comment. It has now been possible to compare the holotype with four additional specimens, all unfortunately without exact locality data so that no further information becomes available on its geographic distribution.¹

The second species here discussed is *Amphisbaena slevini* described by Schmidt (1936, p. 31) from "Manaos, Amazonas" on the basis of a single specimen in the collection of the California Academy of Sciences (C.A.S. No. 49809). He furnished a brief description as well as dorsal, lateral, and ventral views of the head of the type, but did not comment on its caudal segmentation. While the specimen has been referred to twice subsequently (Schmidt and Inger, 1951; Slevin and Leviton, 1956), and there has been mention of the existence of caudal autotomy in the species (Vanzolini, 1951; who also mentioned the skull in a yet unpublished paper), there have been no reports of additional specimens.

It is now possible to expand our knowledge of variation in this form on the basis of a useful series of 25 topotypes collected in January, February, and March, 1943, by E. Thomas Gilliard, who arranged to have a lad follow a bulldozer working on an airport about 1.5 miles north of Manaus. The terminology of redescription follows Gans and Alexander (1962).

I am indebted to the curators of various institutions (identified throughout by abbreviations given in parentheses) for permission to borrow or examine material in their care. Among these are Mr. Charles M. Bogert of the American Museum of Natural History (A.M.N.H.), Miss Alice G. C. Grandison of the British Museum (Natural History) (B.M.), Dr. Alan

¹ While this paper was in press, I received a copy of a paper by Cunha (1961). Most of the specimens cited by him as *Amphisbaena vermicularis* seem to be *A. mitchelli*.

Leviton of the California Academy of Sciences (C.A.S.), Dr. Lucia Rossi of the Istituto e Museo di Zoologia della Università di Torino (I.M.Z.U.T.), and Dr. Jean Guibé of the Muséum National d'Histoire Naturelle, Paris (M.H.N.P.). Examination of the holotype of *A. mitchelli* was made possible by a grant from the estate of Leo Leeser. Dr. Virginia Cummings figured the specimens, and Miss Charlyn Rhodes contributed technical

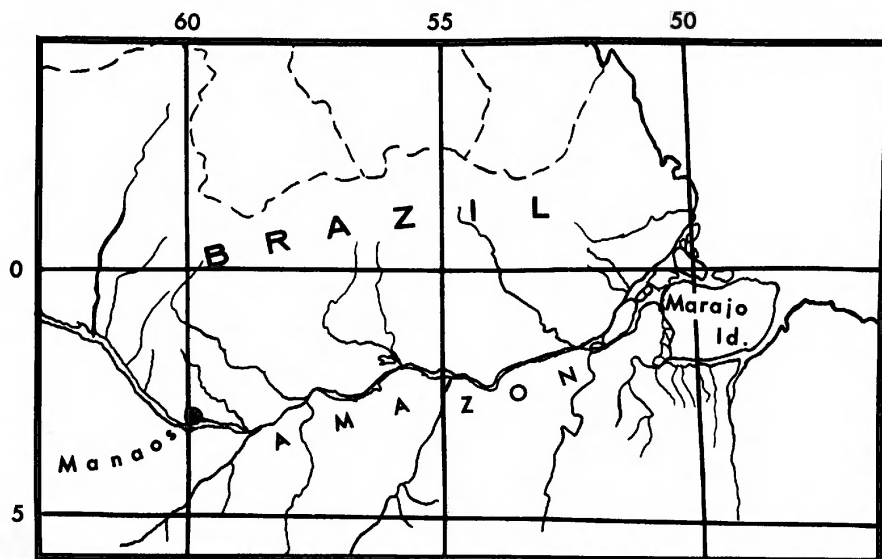


FIG. 1. Map of the lower and middle Amazon, showing the localities mentioned in the text.

assistance. The over-all project owes its support to Grants NSF G-9054 and G-21819 from the National Science Foundation.

Amphisbaena mitchelli Procter, 1923

Amphisbaena mitchelli PROCTER, 1923, p. 1065. Terra typica: "A single adult from Marajo Island, mouth of the Amazon," Brazil.

HOLOTYPE: B.M. No. 1923.11.9.90-RR1946.8.2.31.

DIAGNOSIS: A medium-sized form of *Amphisbaena* with two oval preloacal pores; with the first parietals twice as wide and much larger than the frontals; and with three supralabials and three infralabials. The form has 211 to 220 body annuli; seven caudal annuli up to the autotomy constriction (at which the tail is autotomized in one specimen); 28 to 29 caudal annuli from the cloaca to the caudal tip which is faintly compressed

TABLE 1
DATA FOR SPECIMENS OF *Amphisbaena mitchelli* PROCTER AND *Amphisbaena slevini* SCHMIDT

Species and Number	Body, Lateral, Caudal Annuli	Dorsal and Ventral Segments	Chin Segments	Supralabials and Infralabials	Cloaca	Total Length
<i>A. mitchelli</i>						
B.M. No. 1923.11.9.90— RR1946.8.2.31	220+3+(7)28	14/14-16	3-3	2-2(4)	2-6-12	134+20
From Procter, 1923	[213+ 30]	[14/14]	[4-4]	[2-2]	[2-4-]	—
A.M.N.H. No. 3004	211+4+(7)x	12/14	3-3	2-2(3)	2-6-10	125+(5)
I.M.Z.U.T. No. 341	212+3+(6)27	14/16	3-3	2-2(4)	2-7-10	162+25
M.H.N.P. No. A5479-1	213+3+(7)28	13-14/14	3-3	2-2(4)	2-8-12	152+24
M.H.N.P. No. A5479-2	213+3+(7)29	14/14-16	3-3	2-2(4)	2-6-12	68+11
<i>A. slevini</i>						
C.A.S. No. 49809	210+2+(5)x	12/10	2-2	2(4)	4-8-8	102+(3)
A.M.N.H. No. 64921	209+4+(5)23	12/12	2-2	2(4)	4-6-12	115+16
A.M.N.H. No. 64929	211+2/3+(5)24	12/12	2-2	2(4)	4-8-10	111+17
A.M.N.H. No. 64930	211+3+(6)x	12/12	2-2	2(4)	4-8-11	113+(5)
A.M.N.H. No. 64931	205+3+(5)25	12/12	2-2	2(4)	4-8-10	106+16
A.M.N.H. No. 64932	210+2/3+(5)24	12-13/12	2-2	2(4)	4-6-12	106+14
A.M.N.H. No. 64933	207+4+(5)x	12/12	2-2	2(4)	4-8-10	111+(4)
A.M.N.H. No. 64934	208+3+(5)x	12/12	2-2	2(4)	4-8-10	114+(4)

TABLE 1—(Continued)

Species and Number	Body, Lateral, Caudal Annuli	Dorsal and Ventral Segments	Chin Segments	Supralabials and Infralabials	Cloaca	Total Length
A.M.N.H. No. 64935	207 + 3 + (6)x	12/12	2-2	2(4)	4-8-11	107 + (6)
A.M.N.H. No. 64936	208 + 3 + (5)x	12/12	2-2	2(4)	4-8-10	103 + (4)
A.M.N.H. No. 64937	205 + 3 + (5)23	12/12	2-2	2(4)	4-8-10	108 + 15
A.M.N.H. No. 64938	210 + 3 + (5)24	12/12	2-2	2(4)	4-8-9	111 + 16
A.M.N.H. No. 64921-B	209 + 2/3 + (5)24	12/12	2-2	2(4)	4-8-10	98 + 15
A.M.N.H. No. 64921-C	206 + 3 + (5)24	12/10-12	2-2	2(4)	4-8-10	104 + 15
A.M.N.H. No. 64921-D	205 + 4 + (5)x	12/12	2-2	2(4)	4-8-10	102 + (3)
A.M.N.H. No. 64921-E	205 + 3 + (6)x	12/12	2-2	2(4)	4-8-10	105 + (3)
A.M.N.H. No. 64921-G	210 + 2/3 + (6)x	12/12	2-2	2(4)	4-8-10	114 + (4)
A.M.N.H. No. 64921-H	204 + 3 + (6)x	12/12	2-2	2(4)	4-8-10	83 + (3)
A.M.N.H. No. 64921-I	211 + 3 + (5)x	12-14/12	2-2	2(4)	4-8-x	114 + (4)
A.M.N.H. No. 64921-J	No tail	12/10-11	2-2	2(4)	x-x-x	x + x
A.M.N.H. No. 64921-K	205 + 3 + (5)x	12/12	2-2	2(4)	4-8-10	83 + (3)
A.M.N.H. No. 64921-L	207 + 2 + (6)x	12/10-11	2-2	2(4)	4-8-10	107 + (4)
A.M.N.H. No. 64921-M	208 + 3 + (4)x	12/11-12	2-2	2(4)	4-6-12	111 + (4)
A.M.N.H. No. 64921-N	206 + 3 + (5)25	10-12/11-12	2-2	2(4)	4-8-10	59 + 9
B.M. No. 1949.1.1.1	205 + 3 + (5)25	12/12	2-2	2(4)	4-10-10	106 + 16

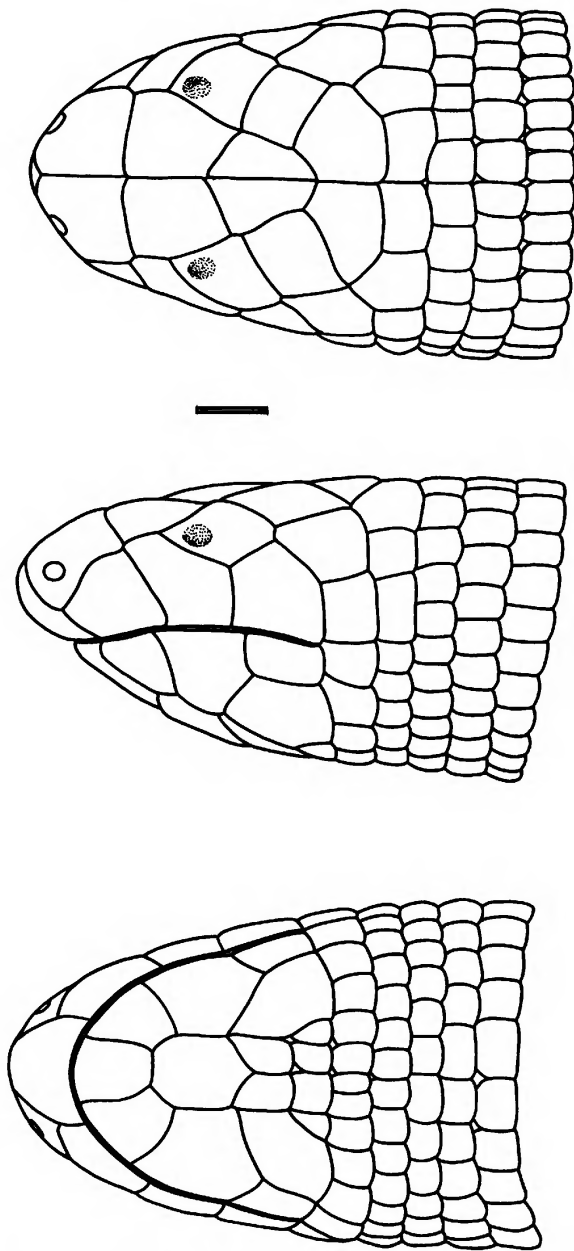


FIG. 2. *Amphisbaena mitchelli*. Dorsal, lateral, and ventral views of the head of M.H.N.P. No. A/5479-1. The line equals 1 mm. to scale. Drawn by V. Cummings.

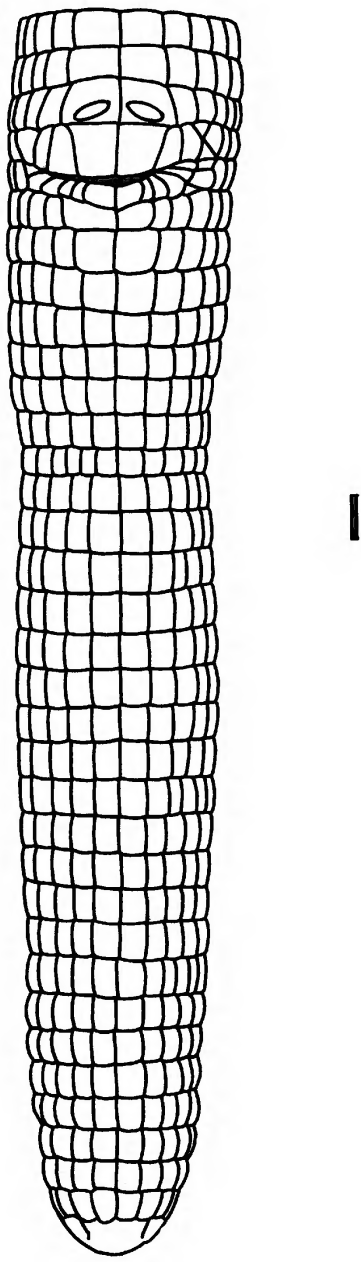


FIG. 3. *Amphisbaena mitchelli*. Ventral view of cloaca and tail of M.H.N.P. No. A/5479-1. The line equals 1 mm. to scale. Drawn by V. Cummings.

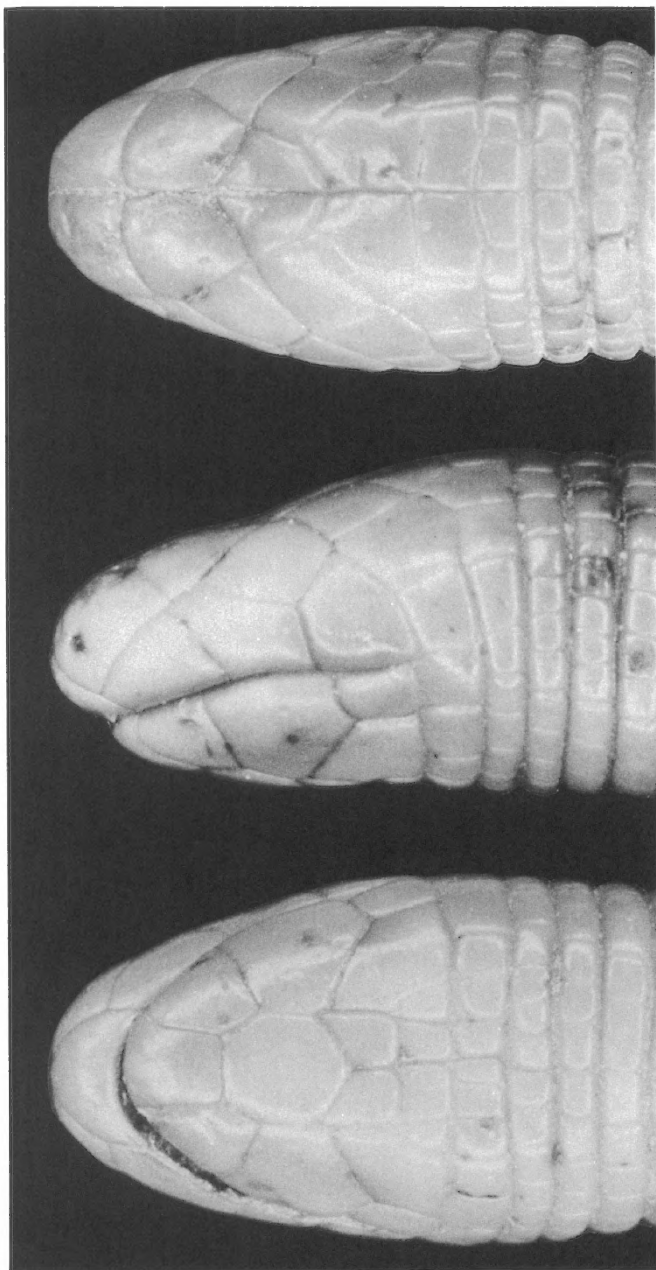


FIG. 4. *Amphisbaena mitchelli*. Dorsal, lateral, and ventral views of the head of M.H.N.P. No. A/5479-1.

laterally; 12 to 14 dorsal and 14 to 16 ventral segments to a midbody annulus; and two precloacal pores. The color of preserved specimens is a uniform darkish brown, darker on the dorsal than on the ventral surface and without any particular variegation or differentiation of the head or tail.

NOTES ON THE HOLOTYPE: B.M. No. 1923.11.9.90-RR1946.8.2.31 is still preserved in the British Museum and is in generally good condition.

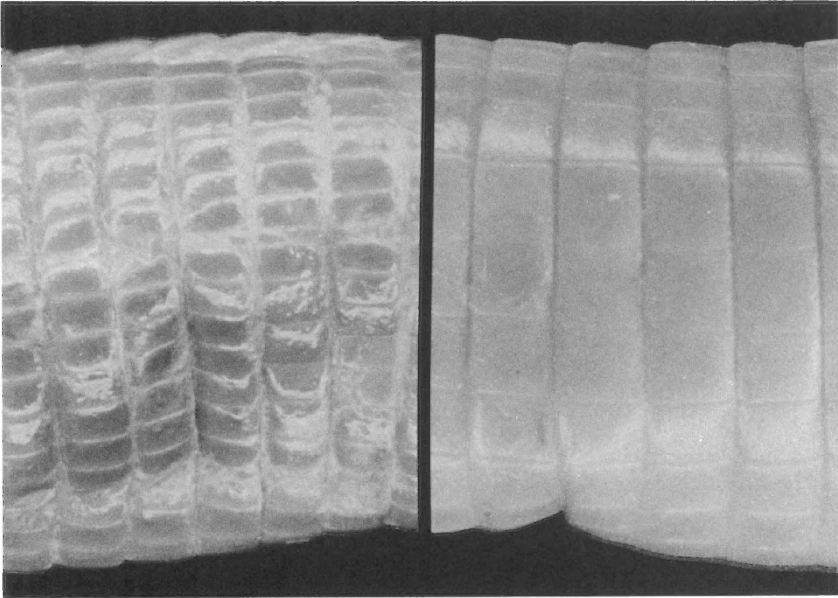


FIG. 5. *Amphisbaena mitchelli*. Dorsal and ventral views at midbody of M.H.N.P. No. A/5479-1. Note difference in segment size.

The original description, unfortunately, leaves much to be desired in that the drawings have been far too idealized, and certain of the mistakes commonly found in descriptions of amphisbaenids may be noted here as well. Procter thus made the common mistake of counting the post-supralabials and recorded four instead of three supralabials by misjudging the angulus oris. The description is also deficient because of the erroneous meristic data (listed in brackets in table 1 of the present paper for purposes of comparison), the fact that the caudal autotomy constriction is neither figured nor mentioned, and the fact that Procter's "light edges" for each segment actually refer to the exposed intersegmental skin, as the segments themselves are quite uniformly colored.

DESCRIPTION: Figure 2 of the present paper shows views of the head; figure 3, the ventral surface of the cloaca and tail; and figures 4 to 7, inclusive, are photographs of the coloration and other aspects of the four specimens. Figure 8 compares body proportions with those of *Amphisbaena slevini*. Meristic data are listed in table 1.

This is a medium-sized species of *Amphisbaena*, of a brownish color, without pattern and with only a slight dorsoventral countershading. The lightened color appears to extend anteriorly to the infralabials and possibly onto the tip of the mental.

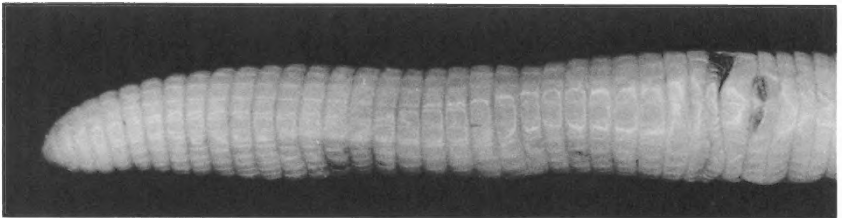


FIG. 6. *Amphisbaena mitchelli*. Ventral view of the tail of M.H.N.P. No. A/5479-1, showing arrangement of precloacal pores and autotomy constriction.

The head segmentation is characterized by lack of major fusions and by a pair of extremely large first parietals. The head is dorsoventrally flattened and of generally oval cross section, with a slightly projecting rostral region. The body continues the slight tendency toward dorsoventral flattening. The muscle masses lying over the temporal region are faintly apparent and change the outline of the head, which in adult specimens at least is quite clearly set off from the rest of the body.

The rostral is no larger than the first supralabial and almost invisible from above. Pairs of very large nasals, large prefrontals, medium-sized frontals, and enlarged parietals form a sequence along the dorsal surface of the head. The anterior edge of the parietals extends somewhat anterior to the level of the angulus oris. The parietals are almost twice as large as the frontals, extending as long as the latter along the midline, but twice as far laterally to form the dorsal continuation of the dorsalmost segments of the first body annulus. There are three supralabials of approximately equal size, with the angulus oris just at the beginning of the fourth segment in line (= post-supralabial). The interlabial sutures run generally dorsad, with only a slight rostrad inclination. The ocular is diamond-shaped, with its anterior edges in contact with the second supralabial and prefrontal.

The mental is a relatively large scale, only slightly smaller than the

first infralabial which is followed immediately by the very large second infralabial and this in turn by the small rectangular third infralabial. The oval to pentagonal postmental takes up an almost square area in the center of the lower jaw and is in contact with the mental and the first infralabials. The spaces between the caudomedial edges of the second infralabials and the medial edges of the third infralabials are taken up by two large malars. Between the malars there are two rows of postgenials, the first containing two teardrop-shaped elements, and the second two, or four, smaller segments, depending upon whether one recognizes the lateral



FIG. 7. *Amphisbaena mitchelli*. Detail of caudal tip of M.H.N.P. No. A/5479-1, showing slight lateral compression.

segments as second postgenials or as corners trimmed off the postero-medial edges of the malars. There is no postmalar row nor are the immediately postmalar segments enlarged by fusion.

Dorsally, the first body annulus includes two segments behind the third supralabial, as well as the postocular which lies in contact with the frontal. The first and second body annuli are dorsally separated by the enlarged pair of first parietals which then form the only remnant of an intercalated dorsal half annulus. The middorsal segments of the second body annulus are slightly widened, but are not elongate. The second and succeeding annuli show no dorsal forward curvature.

There are 211 to 220 body annuli from the back of the third infralabial up to and including the pore-bearing precloacals. The second through fifth annuli are shorter than the sixth to eighth, and these are shorter than the succeeding body annuli. There is no complexing of the pattern in the "pectoral" region. No extra dorsal half annuli could be seen interspersed along the body. There are 12 to 14 dorsal and 14 to 16 ventral segments to a midbody annulus, though the normal pattern appears to be 14-14.

The cloacal region is characterized by two oval precloacal pores, six

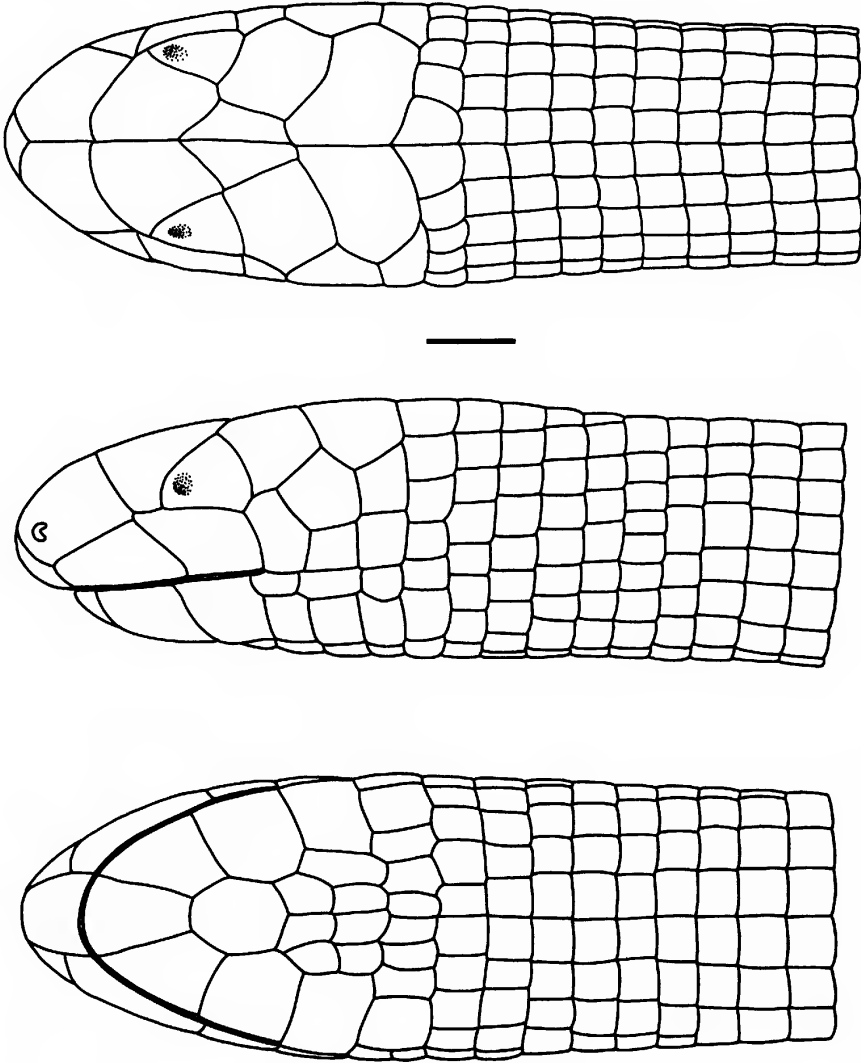


FIG. 9. *Amphisbaena slevini*. Rearranged and redrawn illustrations of the holotype, C.A.S. No. 49809. From Schmidt (1936, vol. 1, pl. 3, fig. 3).

ventral segments are about one and one-third to one and one-half times as wide as long along most of the body. They become slightly wider immediately anterior to the cloaca, with the pore-bearing segments the widest of the series. Otherwise there is only minor change in segment proportions along the length of the trunk.

The body proportions of the four non-autotomized specimens are plotted in figure 8 and show good agreement with one another.

RANGE: Marajo Island, mouth of the Amazon, Para, Brazil.

DISTRIBUTION RECORDS: *Brazil*: "Amazonic," M.H.N.P. Nos. A/5479-1, A/5479-2. "Brazil and Venezuela" (Burt and Burt, 1931), A.M.N.H. No. 3004. Para: I.M.Z.U.T. No. 341. Marajo Island (Procter, 1921): B.M. No. 1923.11.9.90-RR1946.8.2.31 (holotype).

Amphisbaena slevini Schmidt, 1936

Amphisbaena slevini SCHMIDT, 1936, p. 31. Terra typica: "Manaos, Amazonas," Brazil.

HOLOTYPE: C.A.S. No. 49809.

DIAGNOSIS: A small form of *Amphisbaena* without major fusion of head shields; with only two supralabials and two infralabials, but with two pairs of enlarged postlabials following thereafter on the side of the head; and with the postocular and parietal very much enlarged, extending posteriorly to just anterior to the head joint, each larger than the frontal, and the most noticeable feature of the head. The form has 204 to 211 body annuli; five to six (in some specimens four) caudal annuli up to the autotomy constriction (at which the tail is autotomized in more than half of the specimens); 23 to 25 caudal annuli from the cloaca to the bluntly rounded caudal spine; 12 (in some specimens 10 to 14) dorsal and 12 (in some specimens 10 to 11) ventral segments to a midbody annulus; and four precloacal pores or pore scars. The color of preserved specimens is a uniform medium brown, with little countershading and without any particular variegation or differentiation of the head or tail.

NOTES ON THE HOLOTYPE: The typical specimen is in excellent condition and in reasonable agreement with Schmidt's description. The only significant differences are indicated in table 1 and are probably traceable to different methods of counting body and caudal annuli. Schmidt neglected to comment on the tail, which is autotomized and healed, a fact deducible from the relatively short tail length given in his paper. His count of three upper and three lower labials again rests on a different way of establishing the position of the angulus oris.

DESCRIPTION: Figure 9 shows dorsal, lateral, and ventral views of the holotype slightly rearranged and modified from Schmidt (1936, pl. 3, fig. 3); figure 10, the ventral surface of the cloaca and tail; and figures 11 to 14 are photographs of the coloration and other aspects of specimens. Figure 8 compares body proportions with those of *Amphisbaena mitchelli*. Meristic data are listed in table 1.

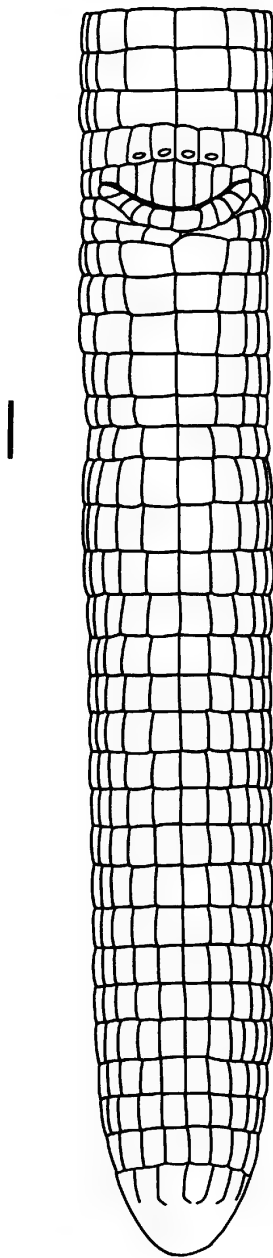


FIG. 10. *Amphisbaena slevini*. Ventral view of cloaca and tail of A.M.N.H. No. 64929, a female specimen from Manaos. The line equals 1 mm. to scale. Drawn by V. Cummings.



FIG. 11. *Amphisbaena slevini*. Dorsal, lateral, and ventral views of the head of C.A.S. No. 49809.

This is a small-sized species of *Amphisbaena*, of a light brownish color, without pattern, and with only a very slight dorsoventral countershading in preserved specimens. A few individuals show what may be a lightened chin region extending up onto the tip of the snout to the level of the eyes, but the small size and poor state of preservation of the series do not permit clear statements on this point.

The head segmentation is characterized by a lack of major fusions and by the presence of a pair of extremely large first parietals and postoculars.

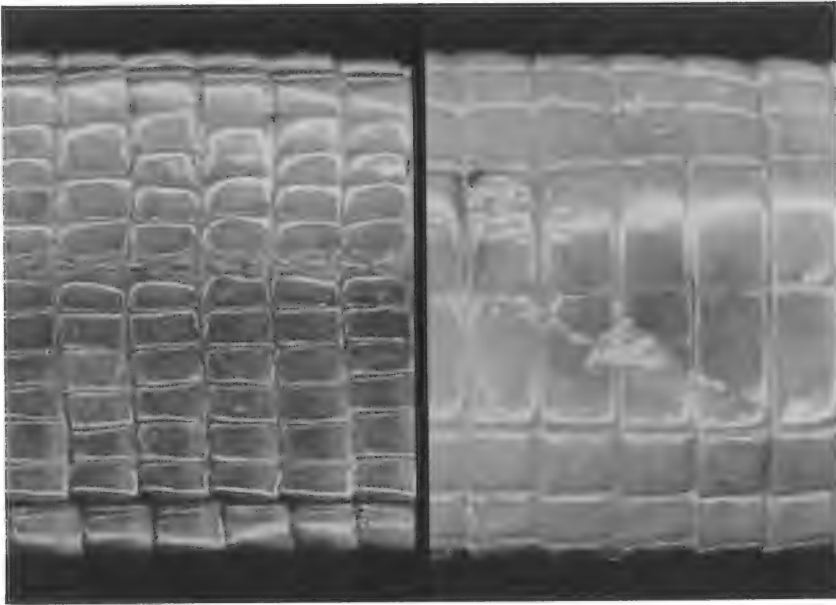


FIG. 12. *Amphisbaena slevini*. Dorsal and ventral views at midbody of A.M.N.H. No. 64935. Note difference in segment size.

These, and other not so significantly enlarged segments of the first body annulus, cover the entire region taken up internally by the skull. The head is slightly flattened dorsoventrally and of generally oval cross section, with the rostral region but slightly projecting. The body continues the slight tendency toward dorsoventral flattening. The muscle masses lying over the temporal region are clearly apparent and change the outline of the head. The latter is quite clearly set off from the rest of the body by a minor postnuchal constriction.

The rostral is slightly smaller than the first supralabial and almost invisible from above. Pairs of large nasals, large prefrontals, smallish



FIG. 13. *Amphisbaena slevini*. Ventral views of the cloaca of a male (left) and a female (right) specimen, A.M.N.H. Nos. 64930 and 64933, respectively, showing differences in expression of precloacal pores.

frontals, and very large parietals form a sequence along the dorsal surface of the head. The posterior edge of the angulus oris lies at the beginning of the posterior third of the frontals. The parietals are more than twice as large as the frontals, extending farther along the dorsal midline and twice as far laterally, to form the dorsal continuation of the third body annulus. There are two large supralabials of approximately equal area, though the anterior is longer and lower than the posterior. The angulus oris lies at the caudal edge of the second supralabial. The third and fourth segments in line (post-supralabials) correspond in size and arrangement to the third and fourth supralabials found in other species. However, dissection disclosed that the angulus oris clearly stops at the beginning of the third segment in line, though there is some slight possibility of separation between the first post-supralabials and post-infralabials. The intersupralabial sutures run generally rostrorodorsad at an angle of 60 degrees to the line of the mouth. The ocular is small, roughly triangular, in anterior contact with the second supralabial and the prefrontal, in posterior contact with the enormous postocular, and in expanded ventral point contact with the first post-supralabial.

The mental is a relatively slender elongate scale, almost twice as long as wide, and only slightly smaller than the first infralabial which is followed immediately by the large second and last infralabial. The small shield-shaped postmental is almost as narrow as the mental. The difference in width between the large second infralabial and the narrow first postlabial is taken up by two segments that correspond in position to the malars (but are not so called here because of the definition of malars as enlarged segments "between the infralabials" by Gans and Alexander,

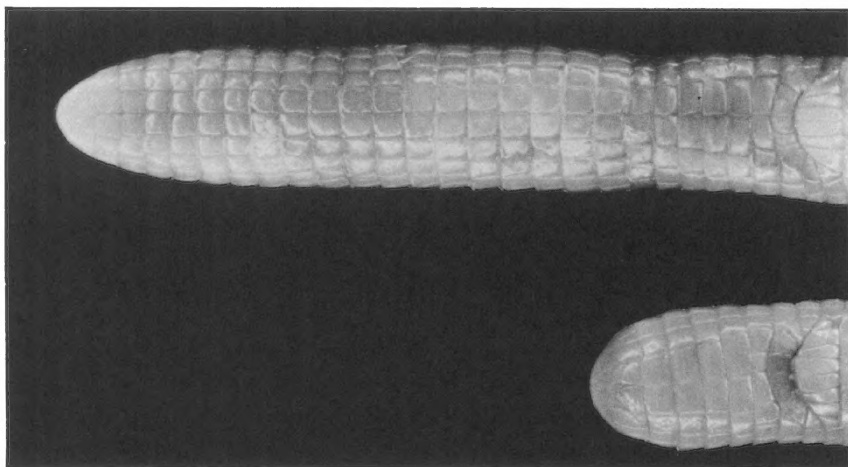


FIG. 14. *Amphisbaena slevini*. Ventral views of the cloaca and tail of an intact (top) and an autotomized and healed (bottom) specimen, A.M.N.H. Nos. 64921 and 64935, respectively.

1962). Between them lie four small segments of the first (pseudo-) postgenial row. The narrowness of the postmental is indicated by the encroachment of the lateral two of these segments upon the space ordinarily taken up by the malar so that the true (pseudo-) postgenials would number two. The enlargement of the second post-infralabials gives the impression of a "post malar row," the extreme lateral segments of which show some tendency toward enlargement.

Dorsally, the first and second body annuli terminate in the enlarged postocular segment which may represent a fusion of the dorsalmost segments of each. The third body annulus generally terminates in the enlarged pair of first parietals, while the fourth annulus includes the slightly but definitely widened second parietals. There are thus no dorsal intercalated half annuli. The posterior margin of the fourth body annulus runs

in a plane normal to the long axis of the body, and the succeeding annuli show no dorsal forward curvature.

There are 204 to 211 body annuli, from the back of the second infra-labial up to and including the pore-bearing precloacals. The third through seventh annuli are shorter than the succeeding body annuli. There is no complexing of the pattern in the "pectoral" region. No extra dorsal half annuli could be seen interspersed along the body, though it was not uncommon to see one scale irregularity each in the 15 postcephalic and the 10 precloacal segments. There are 10 to 14 dorsal and 10 to 12 ventral segments to a midbody annulus, though the normal pattern appears to be 12-12.

The precloacal region is characterized by four precloacal pores, which are clearly defined in males and may be very much reduced in size in juveniles and females. There are six to eight precloacal and nine to 12 postcloacal segments, and two to four, though normally three, rows of laterals. There are four to six, though generally five to six, caudal annuli up to and including the autotomy annulus which is clearly marked by a slight constriction of the tail and a shortening of the annular length. It is probably significant that of the series discussed, 14 of a total of 23 had autotomized tails, varying from recent breaks to completely healed scars. This ratio is very much higher than any previously reported in the literature or encountered in the course of these revisionary studies.

In the intact specimens, the number of caudal annuli varies between 23 and 25. The tail shows some dorsoventral flattening and relatively slight reduction toward the tip, posterior to the post-autotomy-level bulge. The distal tip is bluntly rounded, with a faint tendency toward a vertical oval.

The lateral sulci are clearly marked, after approximately the twentieth body annulus, and continuing up to the level of the cloaca. A sharply defined dorsal annulus runs from the back of the head onto the tail. All three of these sulci, particularly at the midbody region, are wider than a bordering segment and are filled with triangular fragments. The ventral sulcus is indicated as an alignment of unmodified intersegmental sutures along most of the ventral surface.

The middorsal segments are about one and one-half times as long as wide. The midventral segments are more than twice as wide as long along most of the body. It is interesting to note that the pore-bearing precloacals are exactly half as wide as the midventral segments, so that four precloacals take up the space of the two preceding midventrals. There are otherwise only minor changes in segment proportions along the length of the trunk.

The body proportions of the autotomized and non-autotomized specimens have been plotted in figure 8. They show good agreement with one another. Beyond this, and in conjunction with the finding of mature gonads in a number of individuals, they demonstrate quite clearly that *Amphisbaena slevini* is a relatively small species that appears to reach "terminal" size at a snout to vent length in the vicinity of 120 mm.

RANGE: Vicinity of Manaus, Amazonas, Brazil.

DISTRIBUTION: *Brazil*: Amazonas: Manaus (Schmidt, 1936; Schmidt and Inger, 1951; Slevin and Leviton, 1956), C.A.S. No. 49809 (holotype). One and one-half miles north of Manaus (Vanzolini, 1951); A.M.N.H. Nos. 64921, 64921B-64921E, 64921G-64921N, 64929-64938; B.M. No. 1949.1.1.1; D.Z. (?) (not seen).

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